Case Studies of Typical SCR Commissioning Issues & Their Resolutions

Dr. Anupam Sanyal

International Environmental & Energy Consultants, Inc.

Lakeland, Florida 33810 IEEC@AOL.COM

Presented at the

2003 Conference on Selective Catalytic Reduction And Non-Catalytic Reduction for NOx Control

Pittsburgh, Pennsylvania, Oct 29-30, 2003

Sponsored by U.S. Department of Energy, National Energy Technology Laboratory

Outline

- Introduction
- Case Histories of Specific Plants
- Examples of Some Unique Issues
- Conclusions and Recommendation

Introduction

- SCR Retrofit in Response to the SIP Call Rule is a Priority Environmental Project in The USA.
- 100-150 GW Coal fired Units are estimated to be retrofit by SCR
- All Retrofits experienced commissioning issues
- Some experienced unique problems
- Advanced Knowledge of these and how they were resolved can save valuable time and hence cost
- This paper aims at citing some examples and lessons learned

Case Histories of Specific Plants

- PC Fired Units A,B & C (225-330 MW) are the earlier installations
- The major commissioning issues:
  - None achieved Specified NOx Removal Efficiency, requiring major combustion optimization
  - NOx Analyzers of each unit had problems
  - I & C Modification Needed
  - Steam Sootblower operational problem
  - APH Washing Plan formed from dPs of APH & SCR

Case Histories of Specific Plants (Continued)

Unit D Cyclone Fired

- NOx Analyzer Required modification to seal air gaskets
- Original NH3 Transfer Pump Required modification- Single Mechanical face seals replaced with sealless canned motor pumps
- Mal-distribution of NH3 at catalyst inlet due to dilution air system pluggage by ABS, caused by traces of SO_3 in the dilution air from APH leakage.
- Problem solved by re-routing dilution air inlet from the APH Outlet to the FD fan Discharge

Case Histories of Specific Plants (Continued)

Unit E 745 MW Corner Fired

- Extensive Pre-training of the Start-up Team saved valuable time
- NO_x Monitors Required Modification to their seal air gaskets(Same as Unit D)
- Hydraulic Systems of Bypass dampers Required Rework in the field. The SCR Retrofit had Welded Joints
- Piping Arrangement of the dilution air steam coil heat exchangers caused Flow stratification .
  Guide vanes and Perforated Plates corrected the problem

Case Histories of Specific Plants (Continued)

Unit F 675 MW PC

- NO_x Analyzer needed repair, requiring manual operation during repair time
- Ammonia Evaporators Returned to the Manufacturer for Repair

Unit G 468 MW PC

- Severe Premature Catalyst Deactivation due to Arsenic Poisoning, controlled by chemical injection. Coal arsenic content severely underestimated by the wrong method used for measurement

Examples of Some Unique Problems

- 50% additional NH_3 was required and NH_3 slip went up after a short outage. Traced down to the Air Purge Line closing valve was actually open although shown to be in a closed position. Most of the Ammonia/ air mixture was going through the air purge line and not through the AIG.
- Ammonia injection grid used as a ladder by an electrician to change a light bulb! Valve settings got offset- too much Ammonia- too high APH dP- unit inoperable!!
- Trust all documents?
- A satisfactory SCR Control system suddenly went out of control leading to excessive NH_3 slip. Wrong Certification of Concentration of Calibration Gas used to calibrate the NO_x Analyzer

Conclusions

- Some of the commissioning problems & their resolutions of seven earlier coal fired SCR Retrofits have been reviewed
- The study show that most units had - problems with NO_x Analyzers
- Ammonia Distribution
- Combustion Optimization
- Some problems from unexpected quarters were experienced E.G.Faulty Arsenic measurement method, incorrect calibration gas document.
- Prior Knowledge of these issues should help SCR start-up of new retrofits and hence save time & money